**An Internet WebQuest**

**THE CHEMISTRY OF FIREWORKS**

**Introduction**

Kaboom! Oooh! Aahh! The golden sparkles explode and float down the darkened sky, thrilling everyone watching below. Every First of July, Canadians go to local parks to watch exciting fireworks presentations. Fireworks have been a familiar part of celebrations for centuries. For most of that time, the designing of fireworks was a craft. Only recently have people begun to try and understand the science involved in creating the spectacular fireworks displays we all enjoy. What are the component parts of fireworks? What chemical compounds cause fireworks to explode? What chemical compounds are responsible for the colors of fireworks? In this WebQuest you will explore the chemistry of fireworks and answer some of these questions.

**Task**

Your job in this WebQuest is to discover the component parts of fireworks, and to identify the chemical compounds that are responsible for the brilliant colors that light up the sky as fireworks explode. You will explore the history of fireworks and find out when the first fireworks were invented. You will learn about firework design and how fireworks are built. You will also find out what chemical compounds are responsible for the colors seen in fireworks. Finally, you will answer a set of questions about fireworks to demonstrate what you have learned about the chemistry of fireworks. All answers must be in your own words.

**Resources**

Look at the web sites given here to find the information that will enable you to answer questions about the chemistry of fireworks. Feel free to use other websites as well to find our answers. If additional websites are utilized the links must be posted alongside the information taken from the site.

* [**A History of Fireworks.**](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://celebration-of-light.com/competition/#history-of-the-fireworks)At this site, you can learn about the history of fireworks. Where did fireworks begin?
* [**How Fireworks are Made.**](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://www.howstuffworks.com/fireworks1.htm)At this site you can find out what chemical compounds create the colors of modern fireworks.
* [**NOVA Online: Kaboom!**](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://www.pbs.org/wgbh/nova/kaboom/anatomy.html)Go to this site for a diagram of the parts of a modern firework. Each part of the diagram has an active label. Click on each label to learn more about that part of the firework.
* [**The Chemistry of Fireworks.**](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://library.thinkquest.org/15384/chem/)Visit this site to learn more about the chemical reactions in fireworks. Find out what two types of binders are used in fireworks today.
* [**Professional Colors.**](http://www.popularmechanics.com/technology/engineering/gonzo/how-fireworks-are-made)Visit this site to learn how professionals create the colors that appear during the vibrant displays of fireworks.
* [**Lights and Colours.**](http://chemistry.about.com/od/fireworkspyrotechnics/a/fireworkelement.htm)Go to this site to see what chemicals create the colors of firesworks. Before the 19th century, only the colors white, yellow, and orange were possible in fireworks. When did the colors red, green, blue, and purple become possible in fireworks?

**Process**

Read through the following set of questions before you begin your Internet research. As you explore each site, look for answers to the questions.

***Questions about the Chemistry of Fireworks***

1. What exactly is a firework?
2. Where and when were the first fireworks invented?
3. Who were the first Europeans to master fireworks?
4. What type of simple chemical reaction occurs in fireworks?
5. What are the components of black powder? What are the ratios of these components?
6. What three processes cause fireworks to emit light?
7. What types of elements are responsible for the colors of fireworks?
8. What is responsible for the whistling sound that often accompanies fireworks?
9. What are the component parts of modern fireworks? What does each part do?
10. Create a table that lists the chemical compounds that create the following colors of fireworks: blue, turquoise, yellow, pink, red, brilliant red, green, bright green, purple, white. You may use chemical formulas rather than common names of compounds in your table.

**Conclusion**

In the process of completing this WebQuest, you’ve become informed about the chemistry behind fireworks, the chemical compounds that are responsible for the brilliant colors seen in fireworks, and about the component parts of modern fireworks. You have also learned a little about the history of fireworks. You have developed research skills as you explored the web sites given, and identified the relevant information to answer the set of questions above. Did you know that certain chemical compounds produced colors when they are burned? Were you surprised to discover how complex modern fireworks are? Can you see why fireworks can be dangerous for those who don’t understand how they work?

Adapted from <http://www.glencoe.com/sec/science/webquest/content/fireworks.shtml>